

## Additional Classified on Page 15

SALE: MODEL 15 teletype machines, complete with sync. motor, cover, keyboard, spindle and crank, excellent. \$70. each. Model 14 typing reperforator; send, receive complete with sync motor, keyboard, holding magnet, tape retainer, cover and end of line indicator, excellent, \$40. each. Model 14 typing reperforator, receive only, sync motor, tape retainer, cover, excellent, \$30. each. FR&D-10 combination; (reperf-reader and transmitter) with sync motor. Used with model 15 will provide all the functions of a model 19 with much more flexibility, excellent, \$28. each. Here-is-Answerback keyboard; for model 15, 21 characters to set up identification. Excellent \$12. each. Send for teletype catalog - Atlantic Surplus, 300 7th Street, Brooklyn, N.Y. 11215

TT100B/FG Teletypewriter, Send-Rec. Kleinschmidt Lab. Sprocket or friction feed as desired, 115 VAC-DC, 50-60 cps. used, good \$170. each. Atlantic Surplus Sales, 300 7th St. Brooklyn, N.Y. 11215.

TELETYPE MODEL 26, \$22.00 (pick up only) TU-6, glass circuit board construction (June 1967 RTTY Journal) \$69.00. John Herring, Barbara Ave., Wilson Subdivision, Weaverville, Calif. Phone 623-4372

SELLING OUT - TT/L2 95% complete rack mount with Salter PCB. Built in scope monitor. \$75. FOB. Also 100KC counter \$75. Much more for RTTY info. SASE. George Schade 7015 N. 4th Place, Phoenix, Arizona 85020

WANTED RTTY Technical manual TM11-2217 and 60 WPM gears for TS 652 GG. Fred McCown, W7PQJ, PO Box 411, Lebanon, Oregon 97355

WANTED - ALL KINDS of page printers. Any quantity considered, quote your price and a local representative will contact you if reasonable. Lee Brody, N.Y.-N.J. Phone TTY for the Deaf, 15-06 Radburn Road, Fair Lawn, N.J. 07410.

FOR SALE: General Coverage Receiver SP600JX in good condition with I.F. output for RTTY. \$200. W8MSG.

# RTTY

OCTOBER 1969

## JOURNAL

EXCLUSIVELY AMATEUR RADIO TELETYPE

Volume 17 No. 9

30 Cents



'Si' WOLFH



Model 28ASR



Model 28KSR



First Class Mail --

RTTY JOURNAL  
P O Box 837  
Royal Oak, Mich. 48068

## Modification for 'Simplex' AutoCR-LF

IRWIN HOFF, W6FFC

In July-August, 1968, I wrote an article on the "SIMPLEX AUTO CR-LF" system for the model 15, 19, etc. This was based in part on a kit of parts available through Bob Zelenka W8TMO.

For normal "LF" action, the code bars are tilted so that the line feed function bar moves into them, tilting at its base and allowing the bail bar to be engaged by a hook in the line feed bar at the bottom of the machine. This line feed function bar does not tilt the line feed bar until the reset bail has already started back. Keep this sequence in mind!

Now with the "SIMPLEX" system, a wire is attached to that bottom line feed bar and connected at the other end to the platen release rod for support. A clamp with finger is attached to the spring housing that returns the carriage when the carriage return is activated.

This finger engages the wire that was added in the event a carriage return is missed, thus pulling up on the line feed bar at the bottom and causing the line feed lever to be activated. (The line feed vertical rod which turns the platen is connected to the carriage return mechanism as explained in the article, thus the tension on the wire by the finger causes both a line feed and a carriage return action.)

The problem with this arrangement is simple to understand. It is an "unnatural" system, and therefore subject to critical adjustment and malfunction.

This can be easily corrected however. Here is the problem:

As the spring housing rotates and the finger comes closer to the wire, it eventually pulls on the wire and raises the line feed bar. If the wire pulls too tightly, the reset bail cannot move back and it never engages the hook on the line feed bar, yet the spacing of the character just typed allows the carriage to go even further to the right, and now the entire pull of the carriage is resting on the wire and the finger, binding the bail reset bar even tighter, thus "jamming" the mechanism until the operator pokes his finger into the hole in the side to manually return the

carriage, thus releasing the tension on the wire.

If the wire is too loose, then it does not pull the line feed bar up enough, and nothing happens on that character. By the time the next character comes along, the tension is already enough to cause the unit to jam. As a result, the correct tension is quite critical and on my unit would jam several times per week until I noticed it.

Now for the solution.

The wire used was excellent "no give" stainless steel stranded wire with teflon coating. After some experimenting, it was discovered that a wire with "some give" would have to be used, for once the bail reset bar has moved back, "then" is the time the tension on the wire should be enough to pull the line feed bar into the notch. This does not really take much tension at all, but with a "no give" wire, you do not have this "variable tension".

As a result, a system has been evolved that is trouble-free and "fail-safe" from jamming.

Attach the wire to the bottom of the line feed bar as always, but at the top instead of connecting to the platen release bar, shorten the wire and add a small heavy duty spring in "series" with the wire. I used a spring off a model 28 PERF, but it lengthened only slightly with a one-pound pull, and seems ideal for the purpose. I hooked one end of the spring over the little bolt that holds the right stop on the platen release rod, this is the point at which the "SIMPLEX" systems mentions adding a spacer sleeve. By raising or lowering the rotation of that bushing with screw, you can adjust the tension on the spring slightly, but the easiest way to adjust the tension on the wire is to change the solder joint at the bottom. I used crimp connectors on each end, and soldering the crimp connector is too simple to mention.

Now when the carriage gets well to the right, the tension on the spring is such that it does not cause the bail reset bar to bind, but at the same time when the bail reset bar moves to the back, the spring tension now assures the line feed bar raising to a normal position for maximum contact.

This additional spring has solved all the jamming problems and gives quite consistent results.

The spring I used which seems ideal for the purpose is TTY Corp. part number 86304 and costs three cents

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RTTY JOURNAL

## Demonstrating RTTY To The Public -

The following article originally appeared in "ARTS" and has been edited and brought to date by KEITH PETERSEN, W8SDZ.

RTTY does not need to be "shoved down the throat" of radio amateurs. As a matter of fact a recent checkback showed that most of the members who had initially been "High-pressured" into this branch of the amateur radio hobby were the first to drop out. The fascination of controlling a distant machine in its every motion must come upon us without prompting. We who are already "sold" on the idea need only present the facts to an audience of radio amateurs and we will immediately find an enthusiastic group who cannot be restrained from entering RTTY. The balance of our audience will either be bored silly or just mildly interested.

There were those, back in 1946, who wanted to keep ham RTTY exclusive. A plaything of a privileged few, with no "propagandizing" or "campaigning" for new members. It is a safe bet that most of the privileges we enjoy today would not have been available to us if we had followed this course. As in all other forms of amateur radio, our enjoyment increases in proportion to the number of similarly-interested amateurs we can work.

The first two amateur teleprinters were wired up in identical installations in 1946 by W2BFD and one of the sets, complete with RTTY demodulator and radio transmitting and receiving units, was displayed in operation at various radio club meetings in the W2 area. Progress in recruiting new RTTY men was discouragingly slow. For the most part radio amateurs adopted a "tongue-in-cheek" attitude and W2BFD soon found that invitations to lecture on RTTY were only received when the club was desperate for a speaker. A polite way of suggesting that a man was mentally deranged was to refer to him as a "radio-typist". Despite all this, history shows that, slowly but surely, we did gain a few converts at each lecture. A collection of hardier (though not necessarily wiser!) souls, whose preoccupation with RTTY made them immune to the jibes of their fellow amateurs.

The hardest part of the battle is when you are the only amateur in your area interested in printer operation. You have to

stage your demonstrations single-handed and all of the responsibility for planning falls upon your shoulders. If you are contemplating a lecture or demonstration at a local club meeting you can generally count on the club "fathers" to give you a hand with the physical "chores" of moving heavy equipment and making preliminary tests. Some of them will even provide printed literature at their expense, with you furnishing the copy. It is advisable to talk over, in advance, just what aid you may expect from the "committee" in staging your exhibit.

The first thought that occurs is to have a complete radio setup in operation, relying on radio signals, tuned in at random, from RTTY stations in QSO. Unless the distant station transmits by prearrangement you are likely to be embarrassed by not finding a satisfactory signal at the right moment. Even when this is done, a change of propagation conditions may upset your plans. A very attractive demonstration can be made by tuning in a high-speed commercial news-handling station such as the European terminals of the A.P. and U.P.I. networks.

The very best demonstration, however, is a good recording of high-speed radioteletype signals, played back to your RTTY demodulator while a speaker permits the spectator to hear what is "Making The Wheels Turn". Use of this system eliminates the vagaries of propagation completely and allows you to prepare a "message" for your audience. Now, of course, the "message" could be on perforated tape, and it is recommended that a perforated tape installation be made if time and equipment is available, but it will generally be found that a sound recording will make a much more effective display of receiving RTTY signals and, furthermore, will not require an attendant to load tapes continually. It also will eliminate the hazard of a snagged and torn tape "lousing up" your exhibit. The demodulator employed should be of the audio-filter variety, permitting FSK and AFSK reception and facilitating sound-recorded playback of RTTY signals. If at all possible a demodulator equipped with autostart should be chosen, so that start and stop signals may be recorded on the sound tape along with the printer signals. This is a "show-stopper" and always is the reason for an excited

'crowd hanging over the printer.

If an exhibit is being made at a hobby show or similar function, where you may be running the RTTY booth single-handed, plan a self-operating setup, consisting of a short-wave receiver with the dial illuminated and a concealed sound recorder actually feeding the RTTY demodulator. This will operate without attention on your part and permit you to use the time thus saved for chatting with spectators and giving them the personal story of amateur printer operation.

Remember not to "play-up" any specific model of teleprinter since, if the availability picture changes (as it always does), you may have actually performed a disservice to amateur RTTY by suggesting a type of machine not, at that time, being released. Exhibits featuring such "luxury" items as model 28 are dubious in their worth since this model is generally difficult to obtain. A sudden rush for a less-common style of machine has only the inevitable result of a long "waiting list" and eventual grumbling because of the delays. A much better plan is to urge prospective members to acquire those models easiest and quickest to obtain. Then, after learning the intricacies of this new field, they can pass the machine along to another newcomer and graduate to another machine.

From sad experience, gained at several conventions and large public displays, one of the things that should not be done is to allow the general public to come in and type on the keyboard if there is only one printer installation available. The slow and painful typing that generally ensues, and the awkward and improper operation of the machine, quickly bores the audience and they drift away. If a good deal of equipment is installed a "tie-line" circuit can be rigged up with a couple or more sets of printers available for public trial.

In the case of large demonstrations and national conventions, where the work is performed and equipment supplied by a large cooperative group, a traffic center may be established and messages handled. In this case the traffic should be performed on tape by an operator who is skilled. Among radio amateurs may be found many who are employed by communications companies for tape-punching. Even if these amateurs are not, themselves, interested in ham RTTY they may frequently be induced to do the tape-poking for your

"show". Because of the short "life" of such conventions it is rarely worth the fuss to get up transcontinental traffic schedules to get rid of the messages. It has been found far more effective to pipe the signals by VHF (preferably) to the shacks of regular traffic-handling amateurs in the vicinity.

Additional "show-stoppers" can be thought up. One of the conventions, in which our members staged a show, had a mobile RTTY installation in a station-wagon calling in from various locations from time-to-time and "patched" into the printer circuit in the convention hall. If facsimile gear is on hand it can be shown quite effectively the "kinship" between "fax" and "TTY". A diagram or photo can be transmitted by radio-photo and a written description may precede or follow on the teleprinter. Teletype "art" work may be transmitted over the printer. (Teletype "ART" work is the building up of pictures on a page printer out of letters, figures or punctuation). Demonstrations of the various specialized gadgets, designed for use with printers, such as MORES-TO-TTY and TTY-TO-MORSE converters, etc. may be displayed. Various types of teletype demodulators can be displayed also, but care should be exercised or prospective members may be frightened off by the "complication" presented. A "simplest-possible" demodulator should be on exhibit to show that RTTY is not necessarily complex.

A great obligation rests on the shoulders of the sponsors of such shows or affairs. This is the obligation to see that your RTTY journal publisher is advised in ample time, ahead of the actual function, so that mention of it may be made. Many newcomers of recent years to our ranks have not realized the efforts made in their behalf. Since 1946, to pave the way for their entrance into our mutual hobby, it is not uncommon in these cases to see mention made in local bulletins and "dope" sheets, with the RTTY JOURNAL getting late second-hand information. During the exhibit or convention professional photographs should be taken and glossy 8 x 10 enlargements should be promptly sent to the RTTY Journal. On a separate sheet of paper a "reading-from-left-to-right" description of who and what is in the picture should be furnished.

During the first such national convention in which RTTY played an important

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part (the 1949 ARRL Hudson Division Convention in New York) a VHF "repeater" relay link was established with W1AW in Hartford, Connecticut. The hundreds of messages were transmitted from perforated tape on 2 meters and relayed automatically by "repeater" stations placed every 50 miles or so. A pretty YL (W3PUD) sat in at the keyboard perforator. Being a cracker-jack commercial teletype operator the tape was punched at an impressive speed and with great accuracy. Exhibitors at such shows normally are restricted to one location in a booth. A precedent was established at that convention, followed in many of our later shows, of scattering MANY teletype machines around the convention at strategic locations and in other exhibitor's booths. A jack panel at the RTTY booth permitted the scattered printers to be connected to the message circuit or the several "propaganda" circuits. The "propaganda" circuits were fed from a sound recorder and teletype demodulator and gave free "advertisement" to the various exhibitors in whose booths the machines were located. A machine was also situated outside the ticket-entrance to the show with a printed running-commentary on the attractions to be found within, to induce "holdouts" to come in. Frequent mention was printed on the machines inviting the spectators to tear off the "copy" and take it with them.

In several of the conventions a deal was made with other agencies exhibiting RTTY, such as MARS and the NAVY, to tie their circuits in with the amateur lines so that "propaganda" for both services could be displayed on all the machines. In this way, at a large show, the spectator is faced with RTTY no matter where he turns.

It cannot be too strongly urged that the RTTY group should have a definite agreement with the convention committee in writing. Such things as free booth space or, if the booth is "donated" by a commercial exhibitor, how much of his advertising you will be obligated to display. If the committee promises mention of RTTY in their promotion they should be required to furnish a definite statement of the extent of "mention" your group gets. If you are to deliver a lecture at a radio club meeting it is wise to know in advance to what extent you can depend on assistance with the "fetch and carry". In cases of extremely large volumes of message traffic (thousands of messages) it is perfectly all right if the convention committee, or the exhibi-

RTTY JOURNAL

tor "Donating" the booth, pays to have a non-amateur commercial operator punch tape for your installation, provided that a licensed amateur puts the signal on the air.

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## TELETYPEWRITERS FOR the DEAF

A subscription from the TELETYPEWRITERS FOR THE DEAF, Inc., aroused our curiosity and we wrote for more information. Since then we have found that the society is quite well known but as it was new to us there are probably many others that have never heard of the society and its methods of operation.

Briefly it uses telephone lines for transmission, certainly nothing new but in this case all the users are deaf. Also the lines are not directly connected to the printer but tones are sent and then converted to operate the machines. A well known RTTY man, Bob Weitbrecht, W6NRM was the first to design a converter to change teletype signals to tones which could be sent over a phone line and used at the other end to operate a printer. Later with the help of two other deaf experimenters a Mr. Marsters and Mr. Saks they perfected the PHONETYPING terminal unit and a number were experimentally installed around the country. To make a call the member dials the number he wishes, a light on the phone indicates a busy signal, and then as the phone is answered the printer is used for conversation. No direct connection to the phone is necessary, it sits in a cradle and a flashing light indicates an incoming call.

In May of this year over 300 stations were active in the net work with many other applicants waiting for equipment to join. The Society suggests two ways that amateurs might be of service.

Donation of printers, the Society is a tax exempt charity and the value of the donation is tax exempt.

They would appreciate hearing from RTTY users in various parts of the country that might be willing to contribute time and talent towards training deaf persons in the reconditioning and servicing of such equipment that may be acquired.

Any inquiries should be addressed to TELETYPEWRITERS for the DEAF, Inc. PO Box 622, Indianapolis, Ind. 46206. Or if you hear Bob, W6NRM on the air I am sure he can answer many questions.

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# IC End of Line - Indicator for RTTY

ERIC KIRCHNER, VE3CTP

2 Andirendack Ave.

AGINCOURT, ONTARIO

COURTESY CARTG RTTY NEWS

How it works:

IC 1 is a monostable multivibrator. When a key on the keyboard is pushed down IC1 makes a pulse of approximately 150 m/sec. This pulse is shaped in IC2 and fed to IC3 through IC9. IC3 through IC9 is a divide by 64 counter. When keys are operated 64 times the lamp will come on. The lamp will stay on for another 64 key operations which is by far more than is needed to complete a line (72 characters max.) on a page printer. As soon as the

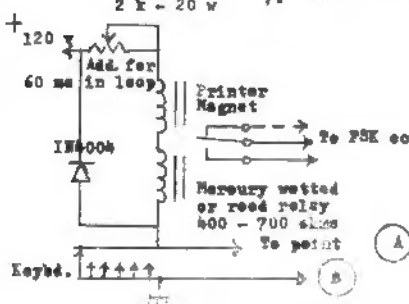
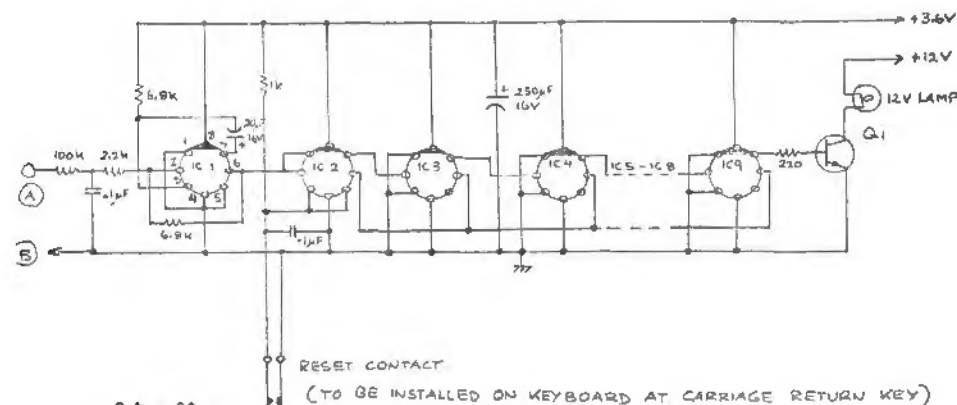
carriage return key is operated the counter is automatically reset to zero and start counting the next line.

Point "A" of the Counter should be connected to the Keyboard contacts as follows:

The plus 3.6v for the L.C.S. should not be less than 3.5v and not more than 4v.

The 12 volts for the lamp are not critical. A 24 volt lamp could also be used with plus 24 volts from the power supply.

A reset contact has to be installed on the keyboard, which is actuated when the carriage return key is pushed down. One side of the switch is grounded.



IC1, IC2 Fairchild L 914  
IC3 to IC9 Fairchild L 923  
Q1 any 300 mw NPN SILICON TRANSISTOR (E.G. 2N3641)

ALL RESISTOR 1/4W 5%  
ALL CAPACITORS CERAMIC OR PAPER EXCEPT FOR ELECTROLYTICS

ALL I.C.S ARE SHOWN LOOKING AT TOP. (Wires down). THE BLACK PORTION DESIGNATES THE FLAT SPOT ON THE I.C.

# Recommended Operating Procedure for Teletype Transmission and Tape Perforation

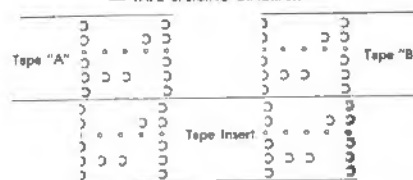
The following article is another in a series of reruns of popular articles from the 1967 Volume of which no back issues are available.

by K6ZBL-

To facilitate reading, editing, and splicing tapes, it is recommended after the last character of each line to use the following in order:

1. One Letters (LTRS) Function
2. Two Carriage Return (CR) Functions
3. Line Feed(s) (LF) Function as required
4. One Letters (LTRS) Function

— TAPE SPLICING DIAGRAM —



The tapes to be spliced are cut as shown and the front end of "Tape Insert" is placed on top of the end of "Tape A" in the alignment indicated (done on the tape head) and run through the TD. This drives the available "lids" through the holes and fastens the splice together. "Tape B" is placed on top of end of "Tape Insert"..... etc.

Note that the "Style" of the tape is not altered; the splice is undetectable after transmission and no string of ineffective LTRS are transmitted. At least five characters of overlap is provided, with full perforations at each end for maximum strength and dependability.

HINT: Trim off the sharp corners of the tape at a 45-degree angle to prevent "dog ears" and the possibility of catching when entering the tape head.

ITEM 1 causes three desirable conditions: (1) Provides five lids to cover the leading edge of the splice and prevents catching and tearing of the splice as it enters the tape head; (2) sets off the machine function symbols from the text to aid in editing tape; (3) causes the machine function symbols to be always printed in the upper (letters) alignment on the tape,

leaving the lower portion clear for writing in "line number index" which is of special interest to designer of "art works" wherein the printed characters are usually only meaningless symbols rather than plain English, which makes it difficult if not impossible to locate a particular line in the tape.

ITEM 2. The double CR provides additional time for the carriage to reach the left hand margin. This may not be of much consequence in hand keying, but when running full speed from a tape, insufficient time can cause overprints and errors in the received copy.

ALWAYS USE 2 CR---Even by Hand Keying

ITEM 3. The Line Feed Operation can be performed while the carriage is in motion, therefore should FOLLOW the CR signals and will also allow more carriage return time.

ITEM 4 causes four desirable conditions: (1) Provides five lids to secure the trailing end of the splice; (2) sets off the machine function symbols from the text; (3) assures that the new line will be printing in Letters, not Figures; (4) provides more carriage return time and/or serves to relock the carriage escapement.

Good luck on your Teletyping with cleaner tapes and more flexible operations!

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C.A.R.T.G.

D-X RTTY

SWEEPSTAKES

Oct. 4-5-6

SEE LAST MONTH for RULES

\*\*\*

# RTTY theory & applications.

RON 'RG' GUENTZLER, W8BBB  
Route 1 Box 30  
ADA OHIO, 45810



## Model 28 KSR Teletype Machines Available.

These machines have all been overhauled by Western Electric. This service alone is worth more than the selling price.

**NORMAL 28KSR COST:** When available to ham through independent sources, 28KSR's in fair-to-good condition sell from \$250-400. Commercial outlets charge \$500-\$700. (You can imagine the cost of the 28ASR with its tape features — up to \$2800 is asked from these outlets.) Thus the price asked is little more than junk weight price. These prices are all for used machines, with new machines costing much more. The 28KSR was over \$1400 new.

**CONDITIONS OF SALE:** All machines shall be sold on an "as is" basis following normal practice in this type of transaction. No refunds shall be made unless no machine is available for the buyer. The buyer agrees to pay for shipping costs at time of delivery. Shipping shall be done by moving van, or "electronic equipment van."

### SPECIAL FEATURES COMMON TO ALL 28'S

These models all have a "stunt box" and a wide variety of interesting features are made possible by this device. Such things as downshift-on-space, auto CR-LF, limited line feed turn-ups, selective-call, non-overline, provision for automatic reperfor control, automatic CW ident, trip-off, remote control of literally any electrical device and literally anything else you may dream up may be programmed.

The keyboard "feel" is comparable to an electric typewriter and does not compare with the manual effort needed on a model 15 or 19, for example. It is a delight to use.

The machines are quite attractive when compared with older models and the noise level is only a fraction of that of the 15 or 19.

Parts of course are easily available by ordering direct from the TTY Corp. (C.O.D. only) or from advertisers listed in the classified section of this publication.

Parts for older machines are becoming more difficult to obtain.

**LENGTH OF OFFER:** A prompt reply is necessary to assure your chance of obtaining a machine before the supply is exhausted.

Negotiations have been completed with Pacific Tel. & Teleg. to release over one hundred model 28KSR teleprinters to NCARTS (Northern California Amateur Radioteletype Society).

These send-receive machines will be for licensed radio amateurs and their private use only. A signed and notarized "waiver" shall be necessary before a machine can be obtained.

A 28KSR is a teleprinter machine with keyboard that is capable of continuous operation at 100 WPM. They have floor-length cabinets and require no stands or tables.

Consideration for purchase shall be in the following manner:

1. San Francisco Bay area residents
2. California residents
3. West Coast residents
4. Domestic USA residents

Canadian orders shall be considered if the buyer is willing to travel to a border city of the USA to get the machine.

Requests for more than one machine may be given consideration on an individual basis.

**PRICE:** TOTAL COST IS \$115 F.O.B. LOS ALTOS CALIFORNIA. TAX INCLUDED.

### FEATURES:

1. 100 WPM gears
2. Downshift-on-space
3. "Figs H" motor stop
4. TWX type
5. Completely overhauled

Conversion to 60 WPM is very simple and the TTY Corp. 161293 gear set is \$4.75.

Auto CR-LF may be easily added but the Bell System machines do not have it, since this feature is needed only on radio circuits, not on phone-line machines.

Non-overline is very easy to add.

The TWX type can be changed to communications type for about \$3.50 and the keys change to match (via mod. kit TP152906) for about \$3.40.

RTTY JOURNAL INSERT.

Loosen staple and remove insert—tighten staple again.

## RTTY SIGNAL BANDWIDTH Part 2 - NONSINUSOIDAL SIGNALS

Last month we discussed considerations necessary when making calculations in ordinary AC circuits. Three things were necessary: 1) The signal (voltage or current) had been present for a while so that any transient had died out, 2) The signal was a pure sinusoid so that formulas such as  $V = IZ$  could be applied and so that ordinary AC meters could be used to obtain meaningful measurements, and 3) The elements within the circuit were linear so that Ohm's law ( $R = V/I$ ) could be applied.

Although these may seem to be quite limiting, most AC circuits meet all the above requirements. However, what happens when a signal such as that found in a telegraph loop is to be subjected to calculation or measurement? In order to answer that question, a few new concepts and terms will be introduced. A signal that recurs regularly is called a periodic signal. A sinusoid is a special form of a periodic signal. A signal that does not recur regularly is called a non-periodic or aperiodic wave. A periodic signal can be viewed on an ordinary oscilloscope with ease (assuming its magnitude and "frequency" are within the capabilities of the scope). A non-periodic signal can, in general, be viewed only on a triggered-sweep oscilloscope. For a non-sinusoidal wave, the oscilloscope may be the only means of measuring the signal.

### TELEGRAPH SIGNALS

When a telegraph signal is sent a character at a time, it is a non-periodic signal, because it is not possible to predict when the next character is going to occur. A telegraph signal when sent from a tape can also be considered as being non-periodic because no two characters are alike, and therefore the signal does not recur in a perfectly repetitive or periodic

fashion. On the other hand, when a repeated character such as the letter 'R' is sent from a test set or from a keyboard that has a repeat key, the signal is then periodic. (Alternate RYs are also periodic. For that matter, so is the sentence "THE QUICK BROWN FOX, etc., if it is continuously repeated, but the period or length of time before the signal exactly repeats itself is so long that it is probably best to consider it non-periodic.)

Although a single repeated character, such as 'R', when sent from a test set is periodic, a much better signal for test purposes and purposes of analysis is a simple square wave. The preference for a square wave over that of a repeated character is that the period of repetition of a square wave is much shorter than that of a repeated character. Figure 1 shows the letter 'R' and a square wave having the same Baud rate. Among other things, the period of repetition of the letter 'R' is 7.42/2 times as long as that of the square wave. This means that when analyzing the two waves, more work is required in the analysis of the signal having the longer period. (Also, when viewing the signals on an oscilloscope, the entire letter must be shown; when viewing the square wave, only two alternate "bits" need be shown. Therefore, the resolution on the oscilloscope is 7.42/2 times better with the square wave. This is especially important when accurate measurements are to be taken.)

### SQUARE WAVES

Because there is a close resemblance between a square wave and a typical telegraph signal, and because the square wave has the shorter repetition period, we will concentrate upon the square wave, and eventually come back to the actual telegraph signal.

If a square wave exists in a circuit, how can the circuit be analyzed? The answer is that there are two different approaches.

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PLACE SIGNED \_\_\_\_\_ DATE: \_\_\_\_\_  
(City/State)

W A I V E R

The model 28KSR teleprinter which I have purchased through the Northern California Amateur Radio Teletype Society is for my personal use. I am a licensed radio amateur and my name and call letters are listed in any current Call Book. (If this is not true, check here: \_\_\_\_\_ and include information with this waiver why it is not true.)

I recognize that I have been offered an unique privilege by NCARTS and the Pacific Telephone and Telegraph Company in the acquisition of this 28KSR, and I am anxious to use this equipment in such a manner that other amateurs in the future may have a similar opportunity to secure equipment from the same source in the same manner. I understand that should the following agreement be violated it could place future transactions in jeopardy.

In obtaining this 28KSR, I unconditionally agree to:

1. It will not be used for gainful interception of commercial message traffic or news handling.
2. It will not be used in any application contrary to the rules of the FCC.
3. It will not be resold for the purpose of financial gain.
4. It will not be resold to other than an amateur radio operator who holds a valid license from the FCC.
5. Before reselling, I will obtain a identical waiver from the new purchaser before surrendering the equipment and one copy of this waiver will be sent to the authorized representative of the RTTY society called NCARTS.
6. It will be employed only for amateur radio communications or for amateur experimental work.
7. In testimony of good faith in the above conditions, permission is hereby granted for an accredited representative of NCARTS or an authorized representative of the Bell Telephone system to inspect the machine upon written request.

8. I have paid \$115 for this machine. Shipping costs extra.

I am currently:

Active \_\_\_\_\_  
Inactive \_\_\_\_\_  
Last active \_\_\_\_\_  
On RTTY \_\_\_\_\_

I operate:

H.F. (10-80) \_\_\_\_\_  
V.H.F. \_\_\_\_\_  
MARS \_\_\_\_\_  
APPROX. HRS/MONTH ON AIR \_\_\_\_\_

I hold a \_\_\_\_\_ license and my call is \_\_\_\_\_

NOTARY \_\_\_\_\_ NAME \_\_\_\_\_

CONF. EXPIRES \_\_\_\_\_ ADD. \_\_\_\_\_

CO./ST \_\_\_\_\_ CITY/ST \_\_\_\_\_

In any event a considerable amount of money is involved in this transaction, and all money must be collected before any of them can be purchased from Pacific Tel. As a result, at some reasonable time after this offer has been made, a cut-off date shall have to be decided. At that time a number of machines corresponding to cash orders shall be purchased. No more shall be available after that time.

**CAUTION:** DO NOT THINK THE AVAILABILITY OF THESE MACHINES REPRESENTS ANY GENERAL RELEASE OF MODEL 28S, OR THAT IF YOU DO WAIT THAT OTHER SIMILAR OFFERS SHALL BE FORTHCOMING. FOR ONE THING, ONLY A FEW SUCH COMPANIES HAVE EVER MADE SUCH MACHINES AVAILABLE TO AMATEURS, AND MOST OF THE GROUPS INVOLVED IN THOSE TRANSACTIONS HAVE LONG SINCE BEEN DISSOLVED.

#### SHIPPING ARRANGEMENTS:

The machines will be shipped via household vans. These firms have a 500-pound minimum charge. A 28KSR weighs 135 pounds so four or more must be shipped to a common point to reduce shipping costs.

With suitable insurance, the cost for each machine when shipped in groups of at least four becomes approximately:

|               |           |
|---------------|-----------|
| Atlanta       | \$32 each |
| Chicago       | \$31 each |
| Denver        | \$23 each |
| New York City | \$35 each |
| Miami         | \$36 each |
| Los Angeles   | \$16 each |

The machines must be shipped to one address, and the total charges on the group paid at that time. This charge of about \$130 (depending on city) would be borne by that one person until the others in the group were picked up.

When ordering a machine, state how far and to what cities you would be willing to go to get your machine. They fit in the back seat or trunk of most American autos. Also state if you are willing to have the group shipped to your home where you will pay this \$130 or so cost until the others get their machine from you. They (and you also) shall be notified by mail where to get their machine.

#### HOW TO ORDER:

1. Sign the waiver and have notarized
2. Obtain a cashier's check or money order for \$115; personal checks not accepted.
3. If ordering more than one machine, duplicate steps one and two, with two waivers and two separate checks together with a statement as to why you should be considered for more than one machine.
4. Make out the check to:  
IRVIN M. HOFF - NCARTS
5. Include statement regarding how far you are willing to drive to get the machine, and what cities you will drive to.
6. Include a statement regarding your willingness to accept a group of 4 or more and pay the shipping costs until you can make arrangements to be reimbursed by those involved.
7. Include a self-addressed envelope for shipping details and receipt.
8. Include your telephone number. It will be used to notify of arrival of your machine in the area.
9. Address the letter to:

Irvin M. Hoff W6FFC  
Sec-Treas. NCARTS  
12130 Foothill Lane  
Los Altos Hills, Calif.  
94022



**Model 28KSR**

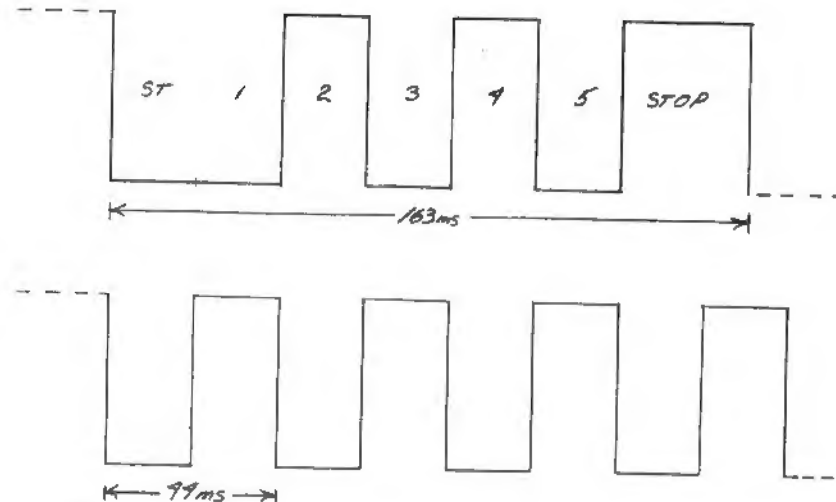


*Fig. 1.. A 60-Speed letter R and an equivalent square wave having equal Baud rates.*

aches that can be used. Which one is used will depend upon the nature of the circuit and the type of results desired. The methods are: 1) Fourier series, and 2) Transient analysis. Before commencing with these two different methods, let us see how they relate to our original AC circuit calculation considerations. Because the square wave is not sinusoidal, we strike out on that score. However, if we can somehow convert the square wave to a sinusoid, then we are back in the game. If we consider the circuit as being all-transient, we may not be able to use ordinary AC circuit techniques but we can go ahead with a straightforward transient technique. If the circuit is non-linear, forget it! About all that can be done with a non-linear circuit is to plug it in, turn it on, let it pass the "smoke test", and then look at it with an oscilloscope. (Actually, calculations can be made, but the non-linear circuit analysis is beyond anything we want to get into here.)

#### TRANSIENT ANALYSIS

For rather simple circuits like a simple loop, the transient analysis is relatively straightforward and may be easy to accomplish. The approach is, basically, to analyze the circuit every time a change is made from a Mark to a Space or from a Space to a Mark. We have done this in this "column" several times in the past when considering loop time constants. (See

RTTY: 1967 DEC, p. 8; 1968 JAN, p. 10; 1968 FEB, p. 10; 1969 MAY, p. 8; 1969 JUN, p. 8).

The transient analysis is quite straightforward and easy when the loop or circuit is simple and when the time constant of the circuit is much smaller than a bit (22 ms in a "60-speed" system). This is because the result of calculation during one interval does not affect that of the next interval. If the time constant is long compared with a bit, the solution becomes more involved because the initial conditions for one interval are dependent upon the results of the preceding interval or intervals. Nevertheless, the calculation is still practical. However, if the circuit is more involved (two energy-storage elements may be enough), some other means of solution might be better.

#### FOURIER SERIES

The approach to solving circuits containing non-sinusoidal, periodic signals that is especially rewarding is that of Fourier series. The basic idea is to take the signal and "decompose" it into a group of sinusoids. So long as the circuit contains only linear elements (and any "turn-on" transient has disappeared), the solution of the circuit is obtained by solving the circuit for each of the sinusoids independently and then simply adding all the results. A side benefit is that the true bandwidth of the signal is also revealed

Continued on page 13

# RTTY-DX

JOHN POSSEHL - W3KV  
Box 73 Blue Bell, Pa., 19422



Hello there. . . .

In writing a column of this type the old adage of "No News Is Good News" does not quite hold true. No news is simply "No News". This month the lack of it can be attributed mainly to your scribe packing up the family and taking off for a holiday on the sandy beaches of the Atlantic, sans receiver, transmitter, and printer, (and the fish weren't biting either). We did manage to get back home about once a week however, and in the short time we had available at the rig we did manage to print a few "good ones". Now we are wondering how much we really missed.

Venkat, VU2KV, is back on the bands with the Quad up and some new tape gear in operation and he is really doing great. In a mid August QSO conditions were quite bad at 0200z so we made a sked for 1200z long path on 14 mhz. Conditions were worse then and Venkat was "unprintable" here, however, he was booming into VK3NR at that time with real solid copy. Venkat is usually on at 0200-0300z and again at 1200-1400z. Also, check on 21095 khz, as he is usually better on that frequency at 12-1400z (short path from eastern USA). VU2KV should be extremely popular this month as he possibly may be the only active Asian station during the Contest and he is a real good Contest operator.

Another RTTY'er we have not heard from in a long time, three years in fact, is Ken, GM3ENJ. He is back now with a fb signal and promises to be much more active from now on. This is good news as Ken was and is about the only RTTY activity from Scotland.

A quick listen on the 14 mhz band in mid August brought this amazing sequence on the page printer; C31BT C31BT C31BT de IIPET IIPET repeated many times on tape. Our first guess would be China, however we now understand that C3 has been allocated to Andorra by the ITU, which of course is just as rare as China on RTTY

these days. I don't like to leave you hanging in mid air like this but that is all we know at the moment. We did not hear any answer and could not raise IIPET to ask any questions. Can anyone enlighten us all?

This month it is our pleasure to congratulate the following station on WAC.

Nr. 121 Uli Stolz DJ9XBA

Uli is the RTTY editor for the DARC and organized the first RTTY WAE Contest, the results of which were published last month and which promises to be an annual affair the last week-end in April. Uli also informs us that the ARRL offers a WAC certificate endorsed for RTTY. Two German stations have already received it. It should be noted that the regular WAC certificate is a IARU Award and amateurs in member countries can apply through their own IARU member society.

In the January 1969 issue of the Journal an announcement was made of an "Annual PX Award", with an engraved Plaque to be awarded to the station working the most prefixes on RTTY in a one year period. In addition, a certificate would be awarded to the winners on each band. As this is being written a bit more than a half year has passed, and while we are not aware of how many of you are working toward the Award, we thought we would list some of the prefixes that have been on during the past several months. While it is by no means complete it will at least give you an idea of what you have missed and perhaps give you an opportunity to catch up in the Contests coming up. You will notice that the stateside prefixes have been left out. With the ten call areas involved plus the possible prefix combinations it would make about forty more prefixes potentially available. An approximate count including stateside indicates there were about 140 or more prefixes available so

RTTY JOURNAL

far this year. Calls are used because either they are the only station active or the most frequently printed. Here they are.

|        |        |            |
|--------|--------|------------|
| CE3EX  | HA5KBF | PE2EVO     |
| DJ4JR  | HB9P   | PI2HRL     |
| DJ5JK  | HK3SO  | PJ2CR      |
| DJ8BT  | HK5SL  | PY2UR      |
| DJ9XB  | HK7XI  | SK0TM      |
| DK1EP  | HR2AFK | SL6ZK      |
| DK2BW  | IKKPK  | SL7AY/mm   |
| DK3FN  | IT1ZWS | SM3BHT     |
| DL1VR  | JA1MP  | SM4GL      |
| DL2EP  | KC4AAD | SM5CLW     |
| DL3II  | KG6AAV | SM7BBJ     |
| DL5PQ  | KH6AX  | SM0KV      |
| DL8VX  | KL7EBK | TG9AD      |
| DM2BRN | KP4BFF | UA1KAL     |
| DM3YYA | KZ5GO  | UA4KED     |
| DM0GST | LA6OI  | UW1DK      |
| DU1DBT | LG5LG  | UQ2KAX     |
| E14AL  | LU3EQ  | VE1AK      |
| E15BH  | LU4DA  | VE2HY      |
| E16D   | LU7DDG | VE3RTT     |
| EL2F   | LU8DR  | VE4FG      |
| EP2CH  | LX1RM  | VE5LG      |
| F2SY   | LX2FB  | VE6MM      |
| F3PI   | OA4BR  | VE7UBC     |
| F5SD   | OA8G   | VO1EE      |
| F8TZ   | OE1NP  | WA2HVN/VO2 |
| F9RC   | OE3PHA | VU2KV      |
| FG7XT  | OE6WF  | VK2WX      |
| G3EFP  | OE8HFL | VK3NR      |
| G6JF   | ON4BX  | VK4NP      |
| G8LT   | ON5DG  | VK7JF      |
| GB2SM  | OZ4EDR | XE1YJ      |
| GI3VDB | OZ6OB  | YV3AY      |
| GM3ENJ | OZ9SL  | YV5AVW     |
| HA4KYB | PA0GKO | ZL2ALW     |
|        |        | ZL2AFE/3   |

We think that the above is quite an impressive group of active prefixes and before you throw up your hands in despair keep in mind that I am not eligible for any of the PX Awards.

We would like to clarify Item 5 in the Rules for the PX Award. It was not the intent that the QSL confirmations would be necessary by January 31, 1970 as the cards are hard enough to come by via the bureau anyway. We are extending the date to March 31, 1970 after which the winners will be determined. At that time you should have the QSL cards available if requested.

Ven VU2KV also writes that 4S7WA and his XYL are going to be operating RTTY as 8QAYL and 8QAWA in the Maldives (be nice eh?) hopefully in September if transportation can be arranged in time.

One old friend we miss on RTTY is Jean FG7XT, our last word was that Jean

was building a new house and when finished would be back on with his powerful and regular signal. Jean we miss you and hope you get back soon.

You never know - A brand new country appeared on September 1st. HP1XHG, Bill, a former W6 operating from Panama City. Bill had a strong signal but was handicapped by a one tube converter. He promises a better converter soon and hopes to be active in the contest.

Now that the Contest session has begun there is always a question as to where to tune for RTTY on the various bands. There are certain "most used" frequencies on some bands but the permission to operate F-1 varies considerably on each band from country to country. Being acquainted only with the Canadian and US regulations we will try to show how this works out.

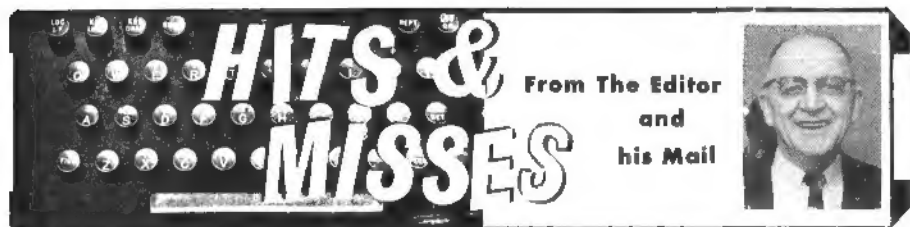
| Band | USA         | Canada      | "Most Used" |
|------|-------------|-------------|-------------|
| 80   | 3500-3800   | 3500-3725   | 3630        |
| 40   | 7000-7200   | 7000-7150   | 7040        |
| 20   | 14000-14200 | 14000-14100 | 14090       |
| 15   | 21000-21250 | 21000-21100 | 21090       |
| 10   | 29000-29700 | 28000-28100 | 28090       |
|      |             | Canada      |             |
|      |             | US          | 29030       |
|      |             |             | 29090*      |

\*Suggest that US hams use this frequency as it makes for fast cross band operation.

It is easy to see that just comparing these two neighboring countries there is a considerable difference in allowable F-1 frequencies on 10 Meters, in fact, it is impossible for each country to contact the other unless each were aware of the others frequency limitations for RTTY. There are many other countries that do not allow F-1 above 28100. On 40 Meters there are many countries that do not allow operation in any mode above 7100 khz although there are groups in the US that operate as high as 7140. For Contests and DX it would seem best to stick to 7040 as has been done with some success in previous years. 80 meters is pretty much up in the air as it is not considered a DX band and you will find RTTY at almost any frequency from 3500 to 3700 khz. (In Europe mainly 50 baud). The US and Canada again tend to center around 3630. In Europe there is activity around 3580 and on Forty Meters as low as 7005-7010. Until I'm corrected by someone "out there" let us try to use the "most used" frequencies as listed above during contests. This means a lot of

Continued on page 14

RTTY JOURNAL



The picture of the Russian keyboard in the last issue brought us almost a complete course in Russian. W8DBC, W4NYF and a Dr. W. Wahlin of New York all sent very interesting explanations of the Russian alphabet which includes 30 characters to our 26. One thing noted is that the upper case and lower case letters are the same except for size. Unfortunately we have no type to show the characters or the extra letters in the alphabet. After reading the explanations however we are fortunate that we do not have to learn Russian. Apparently they use a six level code but how this is compatible with our five level we still don't understand.

Doc Wahlin also objects to the SWL designation as being unflattering to those trying for their license. He suggests HTB (Ham to Be) Doc, maybe you are too literal, after all the OM is not always "old" and the YL is not always "young." Just keep after that license and anyone that can understand Russian like you should soon shed the SWL tag and turn into an Old Man.

A note from VE3FJB says that a simple RTTY book has been published by VE3COL, VE3FPJ and VE3FJB. Selling for \$5. and available from the Radio Society of Ontario, Box 334, Toronto, Canada. The book is in loose leaf form so that it may be kept up to date with supplements and contains chapters on theory, circuits of various machines and several demodulators and other related RTTY equipment.

A check with the FCC in Washington reveals that although it will probably be approved nothing definite has been done with the proposal to allow RTTY operation in the CW portion of the ten meter band. IF the rules change should be announced I am sure that WIAW and other RTTY amateurs will immediately broadcast the changes.

A clipping from K2MOO relates the death, on his 81st birthday of William Dubilier, inventor of the mica condenser, in Palm Beach, Florida.

In his time this was a very important invention and although still of importance the rate of new discoveries and improvements in radio today regales the inventors to almost complete obscurity. Usually they are a team effort by some large corporation. By the time something new is accepted something better has been discovered.



It's no problem for us to turn things around. Several months ago we announced W5VPJ as the first winner of the WAS in 69 award. It should have been W5VJP. Anyone listening on the bands however would know who we meant as Bob has been one of the most active calls this past year. Congratulations again Bob.

Our congratulations also to "Grovie" K9SLQ who has also qualified for this award. Who will be next?

RTTY JOURNAL

Ven VU2KV wonders if anyone has a manual for the "Westre" Divatel dual diversity RTTY receivers. He has a complete set and is using one RX after his 51J4. If anyone can help him the Journal will be glad to forward any information or you may write him direct at 34 Chowhee, Calcutta, India.

\*\*\*

As we reach the deadline for this issue we are waiting for an announcement that will be of extreme interest to at least several hundred subscribers. If the word is "go" we will include the announcement as an insert in the middle of the magazine so it may be removed and the magazine will then be intact with correct page numbering. If the insert is not included, forget we said anything.

\*\*\*

### THEORY - cont.

Continued from page 9

and the effects of frequency response due to intentional or unintentional filtering will become readily apparent. In fact, many times the Fourier series is obtained, not to solve the circuit, but simply to determine the bandwidth required by the signal.

Next month we will discuss Fourier series.

### VHF RTTY NEWS

Ron Finger, W4VZR, and K4OHV and K4KCX are running autostart on 146,700 MHz on FM in the Washington, DC area. We hope that more stations get on in the DC area.

Jim Turrin, WA8DCE, and five other stations (W8VYU, K8WLQ, WA8WNL,

### BACK ISSUES —

The ONLY back issues available are: July through December 1966 - February 1968 to date. (July-August is combined issue.) Copies are 30¢ each. The TT/L-2 reprint is 30¢. RTTY JOURNAL binders are \$2.50 each in the USA and \$3.00 in Canada.

\*\*\*

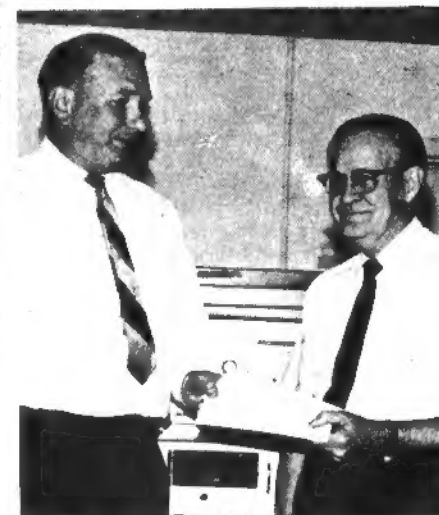
### BROAD MINDED

### USE NARROW SHIFT

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RTTY JOURNAL

### W6AEE WINS HONORS



W6AEE on right....

Pasadena - Merrill L. Swan, W6AEE, has been awarded two \$100 patent awards for inventions developed as an employee of United Geophysical Corp., 2650 East Foothill Blvd. Swan is a systems analyst. His awards were presented by Murray Weingarten, United Geophysical's president, and are for a unique computer and a computer circuit used in seismic data processing. Since starting with United Geophysical in 1936, Swan has received 14 patents covering a wide field of electrical and electronic devices and instruments used mainly in seismic surveys and data processing.

Merrill was the publisher of this magazine for many years and is one of the best known calls on RTTY.

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### RTTY JOURNAL

P.O. Box 837 Royal Oak, Mich. 48068

"Dusty" Dunn — W8CQ

Editor & Publisher

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## DX NEWS- cont.

Continued from page 11

crossband tuning on 10 Meters at the present time until, if and when, the pending shift to 28100 is approved for US hams on RTTY. Also, we would appreciate hearing from other countries listing the F-1 frequencies allowed on the HF bands and if we get enough of them we will publish them in a future issue.

The BARTG puts out a very informative quarterly Newsletter. It gives a real close look into things RTTY in Great Britain and on the Continent including the types of equipment in general use, modifications, TU and FSK techniques, and many other articles of general interest. The latest issue includes a very nostalgic article reviewing the early trials of the "G" men in getting started in RTTY. It is written by the Editor, Arthur Owen, G2FUD, in taking note of the 10th Anniversary of the BARTG.

Anyone interested in subscribing can send Three Dollars to the Treasurer - Miss G. Southby, 51 Norman Road, Swindon, Wiltshire, England. It includes membership in the BARTG.

In closing we wish to thank all of you that sent in information updating your RTTY-DX standing. We missed posting many due to getting the column to Dusty extra early because of the vacation here. Keep in mind that the next listing will be in JANUARY and we will give you a reminder a month before that. Good luck in the Contest.

73 de John

\*\*\*

## RTTY Contest Calendar

The lack of information far enough in advance has held down participation in many contests in the past. As the organizations promoting these contests are establishing them as regular events at certain times of the year, dates are being set well in advance and we will attempt to keep this calendar up to date to allow planning of the future, rules for each contest will be published separately but plan your operating to take in as many contests as possible.

CARTG-Medallion DX Sweepstakes -  
Oct 4-6 - Rules in last issue.  
Volta DX Contest - Dec. 6-7, 1969  
DARA WAE RTTY Contest - last week  
end of April 1970

\*\*\*

WB8CMF, and W8AKU) are running RTTY on FM in the New Philadelphia, OH area. One of the stations is actually a "RTTY SWL", but that is more than half the battle toward getting on. Unfortunately, they are running on 146.720 MHz. Perhaps if they were to hear some "off frequency" signals on 146.700 MHz coming from others in the area, the activity might pick up.

So that's it for this month. Keep those cards and letters coming, folks!!!

--73 ES CUL, RG

\*\*\*

## Operating Procedures -

BILL CARVER, K6OLG

25 April, 1969

Dear Dusty,

Your comments regarding "CW ID TO FOLLOW" and the use of two CR characters are most appropriate. "CW ID TO FOLLOW" typed hunt-and-peck seems interminable. However, I would like to take issue with you regarding the use of the "BLANK" or "LTRS" keys during pauses in normal typing.

Simple limiter-discriminators having no threshold correction (ST-3) do not benefit from typing letters or blanks. The TT/L, however, has the DTC circuit which, in the limiter mode, corrects for mistuning. Long pauses without a space tone causes the TT/L to lose this correction ability.

On HF, where many people use two-tone techniques, the problem is more serious. The slideback detector will misprint badly in the face of slow typing and even a small amount of selective fade. Using a TT/L in limiterless mode does not produce extreme misprinting, but the DTC cannot work properly unless typing is reasonably fast.

Basically threshold correction schemes, DTC or slideback, have capacitor memories which "remember" the strength of mark and space tones, or the voltage levels coming out of the discriminator if using a limiter. These memories are lost in times on the order of a few tenths of a second. Thus those "extra" characters are better than nothing despite the clatter they make.

Yours truly,  
Bill Carver, K6OLG

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RTTY JOURNAL

## CLASSIFIED ADS Rates \$1. 30 words - Additional words 2¢ ea. Closing date 1st of month.

NO GLARE WINDOWS for Model 15 & 19 Printers. Cadmium plated & Gold Iridite finish. \$12.50 P.P. Check or M.O. Bud WA6UEF, 17114 Sunderland Dr., Granada Hills, Calif. 91344.

RTTY GEAR For Sale; List Issued monthly. 88 or 44 mh toroids - 5 for \$2.50 postpaid. Elliott Buchanan and Associates, 1067 Mandana Blvd., Oakland, Calif. 94610

TYPEWRITER RIBBON REINKER, Hand operated model now only \$3.00. K575 or K764 Ink available at All National Cash Register Co. stores at 75¢ per tube. Walter Nettles W7ARS-8355 Tanque Verde Rd. Tucson, Ariz. 85715.

28ASR WITH TD and Electrom converter in excellent condition. Can be seen operating. Asking \$1,350.00. Write W3JZR. Morris Cohen, 400 Brookhaven Rd., Wallingford, Pa. 19086

TELETYPE PICTURES FOR SALE. Suitable for making your own tapes. 50 pictures for \$1.00. Perforated and audio tapes also available. Pictures for volume two solicited. W9DGV. 2210-30th. St. Rock Island, Illinois 61201.

VECTOR C12 PLUG IN UNITS, octal, alum case 3" high. 2" square. Ideal for RTTY filters. New. 75¢ each. Howard Fasold. WA0VQM, 138 Palisade Cir., Manitou Springs, Col. 80829

MODEL 14 TYPING REPERFORATOR, send-receive, with synchronous motor, keyboard, holding magnet, end of lint indicator and cover like new \$40.00 ea. Same as above, no keyboard, receive only \$28.00 ea. Model 15 teletypewriter complete like new \$70.00 ea, with "here is" keyboard for identification \$80.00 ea. Model LO15 teletypewriter complete like new \$80.00 ea. with "here is" keyboard for identification \$90.00 ea. All above machines are in operating condition. Atlantic Surplus Sales, 300 7th St. Brooklyn, N.Y. 11215

SSB FILTERS, 3khz at 64 khz, 8 crystal full lattice by W.E. in/output transformers in filter \$10.00 PP. 88 mh toroids 5/\$1.75 PP. W9FTE, 8800 W. Cloverneck Ct., Milwaukee, Wisc. 53224

LET J & J CUSTOM BUILD you a Mainliner TT/L2 FSK demodulator exactly as described in the May issue of QST with sharp filters for 850 and 170 shift tuned and adjusted in your unit for excellent performance. Also available TT/L2 filters. J & J Electronics, Canterbury, Conn. 06331

SELL MODEL 28 KSR, excellent condition, storage base contains rectifier, line coil unit, TTY sub set, and carrier channel terminal. Asking \$350. Dennis B. Kagel, WA2JWO, 14 West Erie Street, Albany, New York 12208 (518) 489-0476.

REGENERATIVE REPEATER: Teletype TT63A/FGC. All electronic signal regenerator takes biased, distorted, fading signals off the air and "regenerates" a nice clean local square wave signal for the printer. Actually takes only a fraction of the normally required signal to trigger this device. Can also be used as a receiving converter. 115 vt AC 60Hz. Dimensions 8 7/8 high by 19" wide complete with tubes, wetted relay and cable, like new \$16.00 ea. Teletype synchronous motor for model 14, 15 transmitter distributor. excellent \$7.00 ea. Send for free teletype catalog. Atlantic Surplus, 300 7th St., Brooklyn, N.Y. 11215

TOROID COILS 88 mh, uncased, postpaid, 5 for \$2.00. LaVon Zachry, PO Box 845, Apple Valley, Calif. 92307

TOPOIDS 88 or 44 mhy. center tapped, never potted, 5/\$2.00 postpaid. 11/16th oiled Fresh reperforator tape \$3. box/10. Model 32KSR complete \$200. German Model 15KSR with table \$75. Model 15 with tape punch and TD. Table, complete \$120. (Just like model 19 set but only size of a 15 printer). Gears for most speeds. most machines \$6. a set. postpaid. Polar relays \$3. Sockets \$1. Drake 2B & 2BQ \$175. New Clegg 66er \$160. GE portables and mobiles - write. Wanted Ham-M rotator, Bird Thru-line watt meter and elements. Stamp for list. Van, W2DLT. 302R Passaic Ave, Stirling, N.J. 07980

WANTED MODEL 28KSR; in good operating condition for \$250. Also need schematic and/or conversion instructions, to copy, for W.U. Deskfax machine. K. Schwieker, 4K4QR, 1124 Opelika Road, Auburn, Ala. 36830

WANTED: FLOOR OR TABLE Model Console, in good condition, for my #28. Please quote price in first letter. Ben L. Bason, W32MMM, 31 Whittier Avenue, Somerset, N.J. 08873

FOR SALE MODEL 15 with table. Good condition - local sale preferred. 60 WPM gears 201-246-1543 after 6 p.m. Ben L. Bason, W32MMM, 31 Whittier Avenue, Somerset, N.J. 08873

WANTED- TUBES Type 4-400A, sockets and chimneys. Inductor B & W type 850A. Filament transformer, 5 vts-30 amps. B & W choke FC-30A. Five or six foot rack-cabinet with back door, lock and casters. Orville Magoon, 1941 Oakdell Dr., Menlo Park, Calif. 94025

PARTS - ALL MACHINES - fast service on all machines from 14s thru 35s. S.E. for list. Sell Fred your surplus TTY for highest cash or trade. Typetronics, Box 8873, Ft. Lauderdale, Fla. 33310 W4NYF

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